South Carolina

Department of Health and Environmental Control

Bureau of Air Quality

Final Determination

For

BP Amoco Chemical Company – Cooper River Plant
Wando, Berkeley County, South Carolina

November 7, 2014

Final Determination

BP Amoco Chemical Company – Cooper River Plant
Wando, Berkeley County, South Carolina

This review was performed by the Bureau of Air Quality of the South Carolina Department of Health and Environmental Control in accordance with South Carolina Regulations for the Prevention of Significant Air Quality Deterioration.

November 7, 2014

Modeling Analysis Reviewed by:

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I. Time Line (Permitting Action History)

June 21, 2012	Representatives of BP Amoco Chemical Company - Cooper River Plant (BPCR) and TRC Environmental Corporation (TRC) met with the South Carolina Department of Health and Environmental Control Bureau of Air Quality (BAQ) personnel to discuss a proposed expedited Prevention of Significant Deterioration (PSD) construction permit application for a major plant modernization/debottleneck project.
March 20, 2013	Representatives of BPCR and TRC met with SCDHEC personnel for a second time to discuss the draft expedited PSD construction permit application, and how does the addition of two new cooling tower cells relate to the propose PSD project.
April 11, 2013	TRC, on behalf of BPCR, submitted an expedited PSD construction permit application to SCDHEC proposing to modernize and debottleneck the plant at BPCR located in Wando, South Carolina.
April 18, 2013	SCDHEC notified BPCR and TRC via email and phone that SCDHEC accepted the PSD construction permit application into the expedited program.
April 19, 2013	Engineering Services of BAQ e-mailed a copy of the application to Catherine Collins (US Fish and Wildlife Services) and Heather Ceron (US EPA – Region IV) and informed them that BAQ had deemed the application complete.
April 22, 2013	BAQ Permitting issues letter to BPCR to request additional information and clarify items in the application. Facility was given a May 6, 2013 deadline to provide requested information.
April 26, 2013	Tracy Price of SCDHEC sends email to BPCR to request additional information and clarify items regarding the modeling portions of the application.
April 26, 2013	BPCR sent email to James Robinson and Tracy Price requesting a meeting to discuss the information requested by SCDHEC.
May 2, 2013	BPCR and TRC met with SCDHEC at 2600 Bull St., Conference Room 2290, to discuss the information requested by SCDHEC.
May 8, 2013	TRC, on behalf of BPCR, submitted the information as requested by SCDHEC on April 26, 2013.
May 9, 2013	Air Quality Modeling Section (Modeling) sent email to BPCR and TRC requesting additional information on modeling items.
May 9, 2013	TRC, on behalf of BPCR, emailed additional information as requested by Modeling on May 9, 2013.

May 13, 2013	TRC, on behalf of BPCR, submitted additional information as requested by SCDHEC (James Robinson) on April 26, 2013.
May 15, 2013	Modeling sent email to BPCR and TRC requesting additional information and clarification on modeling items.
May 21, 2013	TRC, on behalf of BPCR, emailed additional information as requested by SCDHEC Modeling on May 15, 2013.
May 21, 2013	Brent Pace of BPCR and James Robinson of SCDHEC discussed PSD project updates via phone call.
June 6, 2013	SCDHEC personnel held conference call with BPCR and TRC to discuss PSD netting analysis. BAQ requested that BPCR submit a proper netting analysis of PSD project.
June 12, 2013	SCDHEC personnel held conference call with BPCR and TRC to discuss additional information (control device descriptions, more detailed process and proposed changes descriptions, detail discussion synthetic minor/PSD avoidance limits, reduction in VOC emissions in Wastewater Treatment Area) needed for the PSD application.
June 12, 2013	SCDHEC personnel held conference call with EPA personnel (Katie Lusky) to discuss PSD netting analysis for BPCR PSD project.
June 14, 2013	Brent Pace of BPCR and James Robinson of SCDHEC held follow up phone call for clarification on June 12, 2013 phone call.
June 18, 2013	BAQ Permitting sent email to BPCR and TRC requesting additional information on PSD netting analysis, significant emissions increases, and other items needed for the Preliminary Determination.
June 20, 2013	Brent Pace of BPCR and James Robinson of SCDHEC discussed PSD project updates via phone call.
June 25, 2013	James Robinson held conference call with BPCR and TRC to discuss additional information on PSD netting analysis, significant emissions increases, and other items needed for the Preliminary Determination. BPCR proposes to submit a revised PSD application.
June 26, 2013	Brent Pace of BPCR and James Robinson of SCDHEC held follow up phone call for clarification on June 25, 2013 phone call.
July 2, 2013	Brent Pace of BPCR requested a one week extension to submit a revised application, to July 12, 2013. James Robinson of SCDHEC granted one week extension.
July 10, 2013	Brent Pace of BPCR and James Robinson of SCDHEC discussed clarification of PSD emissions calculations via phone call. Mr. Pace requested an additional one week extension to submit a revised application, to July 19, 2013. Mr. Robinson of SCDHEC granted additional one week extension.
July 19, 2013	Brent Pace of BPCR and James Robinson of SCDHEC discussed PSD updates. Mr. Pace requested an additional two week extension to submit a revised application, to August 2, 2013. Mr. Robinson of SCDHEC granted additional two week extension.

August 2, 2013	Brent Pace of BPCR and James Robinson of SCDHEC discussed PSD updates. Mr. Pace requested to put project on hold for at least three weeks, in order to decide next steps forward. Mr. Robinson of SCDHEC acknowledged hold request.
September 7, 2013	After a few email exchanges between August 2, 2013 and September 7, 2013 discussing the status of revised application, Brent Pace of BPCR and James Robinson of SCDHEC agreed that Brent Pace will notify James Robinson when BPCR is close to submitting a revised application.
December 17, 2013	Brent Pace of BPCR emailed James Robinson of SCDHEC some pages of the draft revised application to review.
January 10, 2014	James Robinson of SCDHEC emailed comments on pages of draft revised application to Brent Pace of BPCR.
January 20, 2014	Brent Pace of BPCR emailed James Robinson of SCDHEC responses to comments.
January 24, 2014	Brent Pace of BPCR and James Robinson of SCDHEC discussed responses to comments on pages of draft revised application.
March 11, 2014	TRC, on behalf of BPCR, submitted a revised expedited PSD construction permit application to SCDHEC.
March 14, 2014	James Robinson of SCDHEC emailed Natasha Hazziez of EPA Region 4 an electronic copy of the revised PSD application.
March 17, 2014	James Robinson of SCDHEC emailed Brent Pace of BPCR to request additional information and clarify items in the revised application.
April 3, 2014	Brent Pace of BPCR and James Robinson of SCDHEC discussed March 17, 2014 request for additional information to clarify items in the revised application.
April 9, 2014	Brent Pace of BPCR emailed James Robinson of SCDHEC some responses to March 17, 2014 request. BPCR need to send updates and replacement pages to the revised application.
April 14, 2014	James Robinson of SCDHEC emailed Natasha Hazziez of EPA Region 4 additional information for revised PSD application.
May 8, 2014	Natasha Hazziez of EPA Region 4 and James Robinson of SCDHEC discussed BPCR emissions calculations via phone call.
May 21, 2014	Brent Pace of BPCR emailed James Robinson of SCDHEC updated information on removal of synthetic minor limits.
May 23, 2014	Brent Pace of BPCR emailed James Robinson of SCDHEC updated emissions spreadsheets.
May 30, 2014	Brent Pace of BPCR emailed James Robinson of SCDHEC updated emissions spreadsheets.
June 4, 2014	SCDHEC personnel held conference call with BPCR and TRC to discuss emissions calculations, synthetic minor limit removal, BACT limits, and other PSD items.

June 9, 2014	Brent Pace of BPCR emailed James Robinson of SCDHEC updated emissions spreadsheets.
June 11, 2014	Brent Pace of BPCR and James Robinson of SCDHEC discussed removal of synthetic minor limits and BACT limits.
June 17, 2014	Brent Pace of BPCR sent an email to James Robinson of SCDHEC discussing BACT limits, synthetic minor limits, and additional equipment needing BACT.
June 20, 2014	SCDHEC personnel held conference call with BPCR and TRC to discuss BACT short-term limits, synthetic minor/PSD avoidance limits, and other items pertaining to the revised PSD application.
June 25, 2014	SCDHEC personnel held conference call with BPCR and TRC to discuss BACT analysis.
July 2, 2014	SCDHEC personnel held conference call with BPCR and TRC to discuss BACT analysis.
July 10, 2014	SCDHEC personnel held conference call with BPCR and TRC to discuss BACT analysis.
July 16, 2014	SCDHEC personnel held conference call with Brent Pace of BPCR to discuss BACT analysis.
July 23, 2014	Brent Pace of BPCR and James Robinson of SCDHEC discussed BACT analysis.
July 29, 2014	James Robinson of SCDHEC emailed Brent Pace of BPCR a list of discussion items on the BACT analysis.
July 29, 2014	Brent Pace of BPCR sent an email to James Robinson of SCDHEC responses to BACT analysis discussion items.
August 7, 2014	SCDHEC personnel held conference call with BPCR and TRC to discuss BACT analysis.
August 12, 2014	TRC, on behalf of BPCR, submitted a second revised expedited PSD construction permit application to SCDHEC.
August 20, 2014	Brent Pace of BPCR and SCDHEC personnel discussed PSD application questions and potential affects of temporary compressors on BACT analysis.
August 27, 2014	Brent Pace of BPCR and James Robinson of SCDHEC briefly discussed modeling changes and control technology search.
August 29, 2014	James Robinson of SCDHEC emailed Brent Pace of BPCR a draft of the preliminary determination (PD) for comments.
September 5, 2014	Brent Pace of BPCR emailed James Robinson of SCDHEC comments on draft PD.
September 9, 2014	SCDHEC personnel held conference call with BPCR and TRC to discuss draft preliminary determination.
September 10, 2014	James Robinson of SCDHEC emailed Brent Pace of BPCR a draft of the statement of basis (SOB).

September 11, 2014	SCDHEC personnel held conference call with BPCR to discuss draft preliminary determination.
September 12, 2014	Brent Pace of BPCR emailed James Robinson of SCDHEC additional comments on draft PD.
September 12, 2014	Brent Pace of BPCR emailed James Robinson of SCDHEC comments on draft SOB.
September 24, 2014	James Robinson of SCDHEC emailed Brent Pace of BPCR a draft of the PSD permit.
September 25, 2014	Brent Pace of BPCR emailed James Robinson of SCDHEC comments on draft PSD permit.
September 25, 2014	SCDHEC personnel held conference call with BPCR and TRC to discuss draft PSD permit.
September 26, 2014	James Robinson of SCDHEC emailed Brent Pace of BPCR a draft of the PSD permit, SOB, and PD.
September 30, 2014	Brent Pace of BPCR emailed James Robinson of SCDHEC comments on draft PSD permit, SOB, and PD.
October 1, 2014	James Robinson of SCDHEC emailed Brent Pace of BPCR an updated draft of the PSD permit, SOB, and PD.
October 8, 2014	The BAQ placed the PSD Preliminary Determination and PSD Construction Permit No. 0420-0029-CU on public notice for a thirty-(30) day comment period by publication in *The Post & Courier* newspaper in Charleston, South Carolina. All appropriate Federal and State Officials were notified.
November 7, 2014	The BAQ issued the PSD Final Determination and PSD Construction Permit No. 0420-0029-CU for BPCR.

II. Introduction and Preliminary Determination

A. Project Overview

BP Amoco Chemical Company – Cooper River Plant (BPCR) submitted a Prevention of Significant Deterioration (PSD) construction permit application to the South Carolina Department of Health and Environmental Control (SCDHEC), Bureau of Air Quality (BAQ), to modify the #1 and #2 Oxidation (OX) Units to remove limitations that prevent the units from operating at their unit design capacities (debottlenecking); and to make minor modifications to the #1 and #2 PTA Units to reduce operating costs. In general, these modifications will include improvements to the reaction environment, additional reaction air capacity, optimization of the recovery systems, improved Dehydration Tower (DHT) operation, improved energy recovery, removal of several emission points, addition of dense phase conveying and additional cooling tower capacity. These changes will result in increased actual hourly production and emissions rates, but will not increase maximum production rates or potential emission rates. This project is referred to as the OX Modernization/Debottleneck project.

The specific equipment revisions, additions, and removals included in the proposed project are as follows:

1. #1 OX unit
   - Replacement of the four existing reactors (BR-301 A-D) with a new single more efficient reactor (BR-301)
   - Replacement of the reactor overhead condenser system
   - Replacement of the air compressor rotor to reduce energy consumption
   - Direct injection of Paraxylene (PX) to the new reactor
   - Additional reactor overhead recovery capacity by replacing equipment with an improved design
   - Routing of 1st crystallizer (BD-401) vent to reactor off-gas recovery system
   - Maintain power recovery in off-gas expander by lowering upstream pressure drop
   - Conversion of dehydration tower (DHT) to azeotropic distillation unit
   - Change DHT overhead recovery system to a two-stage system by:
     - Converting existing DHT Scrubber (BT-702) to a one-stage acid scrubber
     - Routing the DHT Scrubber vent to the Low Pressure Absorber (LPA) (BT-603)
     - Revising the packing in the LPA
   - Change High Pressure Absorber (T-401) internal packing
   - Addition of dense phase conveying (conveyance of solids with less carrier gas)
   - Additional capacity for filters
   - Removal of the low pressure vent gas treatment (LPVGT) compressor (BC-710)
   - Removal of the solvent stripper (BT-605)
   - Removal of the residue evaporator (BM-606) and catalyst recovery unit (BD-625/631/632/BE-645)
   - Removal of the PX Stripper (BT-740)
   - Addition of a steam turbine to generate power from excess low pressure steam
   - Addition of a 82,000 gallon fixed roof NBA storage tank (size subject to change when BPCR goes through installation process)
   - Replacement of existing Emergency Generator (BM-1201) with a new one
   - Addition of a new Emergency Generator (BM-1204)

2. #1 PTA unit
   - Revisions to crystallizer vent scrubber (CVS) (CM-301) to improve energy recovery
   - Addition of a 5th crystallizer (CD-300)

- Addition of dense phase conveying
- Replacement of dryer (CM-403B)

3. #2 OX unit
   - Direct injection of PX to reactor
   - Re-rating (Modification) of air compressor for additional capacity
   - Replacement of reactor overhead condenser
   - Conversion of dehydration tower (DHT) (DT-403) to an azeotropic distillation unit
   - Modification of packing or trays in DHT (DT-403), High Pressure Absorber (HPA) (DT-111), LPA (DT-302), Dryer Scrubber (DT-301) and High Pressure Vent Gas Treatment System (HPVGTS) Scrubber (DT-1821)
   - Routing of DHT (DT-403) vent to LPA system (DT-302)
   - Addition of dense phase conveying
   - Removal of Low Pressure Vent Gas Treatment (LPVGT) System compressor (DC-304)
   - Removal of solvent stripper (DT-402) system
   - Removal of the residue evaporator (DM-403) and catalyst recovery unit (DD-412/413/414/DE-416)
   - Removal of PX Stripper (DT-404)
   - Addition of a steam turbine to generate power from excess steam
   - Addition of a 75,000 gallon fixed roof NBA storage tank (size subject to change when BPCR goes through installation process)

4. #2 PTA Unit
   - Modifications to CVS (DM-601) to improve energy recovery
   - Modification of piping system from PTA Feed Drum (DD-500) to the Sundyne pumps
   - Addition of a 4th Sundyne pump
   - Addition of dense phase conveying
   - Replacement of dryer (DM-703)

5. Cooling Towers
   - Additional #1 Cooling Tower capacity
   - Additional #2 Cooling Tower capacity

The project will also include smaller items that will occur on all the units in the following general categories:

1. Additional and/or improved automation, multivariable control schemes, and on-line analyzers to increase unit reliability and improve process control.
2. Replacement of process equipment and piping that are negatively impacting maintenance costs and unit reliability.
3. Replacement of obsolete or end-of-life equipment such as piping, instruments, and computer equipment, where replacement parts are no longer available and equipment that has been determined to be too worn or corroded.
4. Replacement of exchangers and vessels to improve metallurgy, reduce corrosion, and reduce maintenance costs.

As part of this project, BPCR is removing synthetic minor PSD avoidance limits that were established in construction permits 0420-0029-CF, -CJ, -CP, and -CR for the following emission points: #1 OX DHT Scrubber, #1 and #2 OX LPA's, #1 and #2 OX HPVGTS, #2 PTA Crystallizer Vent Scrubber (CVS), #2 OX HPVGTS Heater, and the combined limit for CR#1 and CR#2 Plants. The table below lists the individual synthetic minor limits that will be removed. These emission points have been included in the BACT analysis.

Table 1: Synthetic Minor Limits To Be Removed

OP ID	CP ID(s)	Process/Equipment (Equipment ID)	Pollutant	Emission Limitation (lb/hr)	Emission Limitation (TPY)	Proposed BACT Limit (lb/hr)
03	CP & CR	#1 OX LPA (BT-603)	VOC	40	80	9.60
03	CR	#1 OX LPA (BT-603)	CO	N/A	40	4.10
03	CP & CR	#1 OX DHT Scrubber (BT-702)	VOC	60	165	N/A(1)
03	CR	#1 OX DHT Scrubber (BT-702)	CO	N/A	380	
03	CJ & CR	#1 OX HPVGTS (HPA (BT-401))	VOC	85	80	4.70
03	CJ & CR	#1 OX HPVGTS (HPA (BT-401))	CO	1452	375	87.9
05	CF(2)	#2 OX LPA (DT-302)	VOC	15.57	N/A	8.85
		#2 OX HPVGTS (HPA (DT-111))				3.50
05	CF(2)	#2 PTA Unit CVS (DM-601)	VOC	25.6	N/A	20.0
05	CF(2)	#2 OX Fugitives	VOC	3.5	N/A	HON LDAR
05	CF(2)	#2 OX HPVGTS Fired Heater	VOC	0.84	N/A	0.0055 lb/MM BTU
03-06	CP	Combined total for CR#1 & CR#2	VOC	N/A	1825	Replaced with individual vent limits

(1) The #1 OX DHT Scrubber will no longer vent to the atmosphere and is being routed to the #1 OX LPA. The #1 OX LPA BACT limit accounts for the #1 OX DHT Scrubber emissions.

(2) Construction Permit 0420-0029-CF established a total PSD avoidance limit of 49.26 lb VOC/hr for the Cooper River #2 Plant. This limit consisted of these four sources of emissions, and the following sources of emissions: Incremental increase from the Tank Farm (0.02 lb/hr) and Wastewater Fugitives (3.11 lb/hr), the Anaerobic Reactor (0.31 lb/hr), and the CO_2 Stripper (0.35 lb/hr). A revised PSD avoidance SM limit established through construction permit 0420-0029 will be the sum of the emissions from the Tank Farm, Wastewater Fugitives, Anaerobic Reactor, and CO_2 Stripper (3.79 lb/hr).

Due to emissions increases associated with this proposal, the project is subject to S.C. Regulation 61-62.5, Standard No. 7, "Prevention of Significant Deterioration (PSD)". This regulation is equivalent to the Federal Prevention of Significant Deterioration of Air Quality regulations in Title 40 Code of Federal Regulations (CFR) Section 52.21. Pursuant to these regulations, new major stationary sources and modifications to major stationary sources of air pollution must demonstrate that they will not significantly deteriorate the air quality in their region. BPCR has potential emissions of VOC and CO, which exceed the significance levels allowed in this regulation. The PSD review was conducted for VOC and CO and includes a Best Available Control Technology (BACT) determination and Ambient Air Impact Analyses.

B. Regulatory Applicability

The increased production capacity results in potential emissions that exceed the PSD significant thresholds. By virtue of the proposed increase, this project is subject to review under the following standards in S.C. Regulation 61-62 and Federal standards:

- SC Regulation 61-62.5, Standard No. 2 "Ambient Air Quality Standards"
- SC Regulation 61-62.5, Standard No. 3 "Waste Combustion and Reduction"
- SCC Regulation 61-62.5, Standard No. 4 "Emissions from Process Industries"
- SC Regulation 61-62.5, Standard No. 7 "Prevention of Significant Deterioration"
- SC Regulation 61-62.60 "South Carolina Designated Facility Plan and New Source Performance Standards"
- SC Regulation 61-62.61 "National Emission Standards for Hazardous Air Pollutants (NESHAPs)"
- S.C. Regulation 61-62.63 "NESHAPs for Source Categories"
- 40 CFR 60, Subpart A "Standards of Performance for New Stationary Sources - General Provisions"
- 40 CFR 60, Subpart Db "Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units"
- 40 CFR 60, Subpart VV "Standard of Performance for Equipment Leaks of VOC in Synthetic Organic Chemical Manufacturing Industry (SOCMI) for which Construction, Reconstruction, or Modification Commenced After January 5, 1981, and on or Before November 7, 2006"
- 40 CFR 60, Subpart VVa "Standard of Performance for Equipment Leaks of VOC in Synthetic Organic Chemical Manufacturing Industry (SOCMI) for which Construction, Reconstruction, or Modification Commenced After November 7, 2006"
- 40 CFR 60, Subpart III "Standard of Performance for VOC Emissions from SOCMI Air Oxidation Unit Processes"
- 40 CFR 60, Subpart NNN "NSPS for VOC Emissions from SOCMI Distillation Operations"
- 40 CFR 60, Subpart IIII "NSPS for Stationary Compression Ignition Internal Combustion Engines"
- 40 CFR 61, Subpart FF "National Emission Standards for Benzene Waste Operations"
- 40 CFR 63, Subpart A "General Provisions"
- 40 CFR 63, Subpart F "National Emission Standards for Organic Hazardous Air Pollutants (NESHAPs) from the SOCMI"
- 40 CFR 63, Subpart G "NESHAPs From the SOCMI Process Vents, Storage Vessels, Transfer Operations, and Wastewater"
- 40 CFR 63, Subpart H "NESHAPs for Equipment Leaks"
- 40 CFR 63, Subpart ZZZZ "National Emission Standards for Hazardous Air Pollutants (NESHAPs) for Stationary Reciprocating Internal Combustion Engines (RICE)"
- 40 CFR 63, Subpart DDDDD "NESHAPs for Industrial, Commercial, and Institutional Boilers and Process Heaters"
- 40 CFR Part 64 "Compliance Assurance Monitoring (CAM)"

C. Significant Emission Rates

As shown in Table 2, this project exceeds the significant threshold as defined under PSD for CO and VOC emissions. Emissions calculations for the modified units were based on actual-to-potential test to determine if there was a significant emissions increase.

Table 2: PSD Applicability Analysis			
Pollutant	**Controlled Emissions Increase**	**PSD Significant Threshold**	**Significant Increase?**
	TPY	**TPY**	
PM	7.0	25	No
PM_{10}	6.6	15	No
$PM_{2.5}$	5.8	10	No
SO_2	0.2	40	No
NO_X	27.8	40	No
CO	644.8	100	Yes
VOC	200.3	40	Yes
CO_2e	17,300	75,000	No

III. Final Determination

On October 8, 2014, the BAQ made a preliminary determination that the BP Amoco Chemical Company - Cooper River Plant may be modified if the emission limitations and conditions outlined in Draft PSD Construction Permit No. 0420-0029-CU are met. This draft construction permit was included as Appendix D of the Preliminary Determination. The Statement of Basis that contains explanations of the permitting actions was included as Appendix E of the Preliminary Determination. The Public comment period closed on November 6, 2014. No comments were received from the United States Environmental Protection Agency (EPA), the Federal Land Manager (FLM), BP Amoco Chemical Company - Cooper River Plant, or members of the public during the public comment period.

On November 7, 2014, the BAQ made a final determination that the BP Amoco Chemical Company - Cooper River Plant proposed project may be approved provided the emission limitations and conditions outlined in Construction Permit No. 0420-0029-CU are met. The Appendix A of this Final Determination contains a copy of the final issued construction permit.

Appendix A

Issued Construction Permit 0420-0029-CU